

The Outlook for Extremely Preterm Infants

JFA Murphy

Improving the outcome for extremely preterm infants less than 27 weeks gestation is one of neonatology's major challenges. Although small in number, they account for a high proportion of the intensive care days undertaken in neonatal intensive care units. Extremely preterm birth affects 2-5 in every 1000 pregnancies¹. In addition, maternal morbidity, including sepsis and peripartum haemorrhage affects 25% of the mothers of the infants delivering at these low gestations. In Ireland in 2020 there were 287 infants with a gestational age less than 27 weeks². These fragile, immature infants are at high risk both in terms of morbidity and mortality. Over time the mortality rates in preterm infants have decreased. MBRACE-UK reported as follows: 30% survival @ 22 wks, 40% survival @ 23 wks, 60% @ 24 wks, 70% @ 25 wks, 80% @ 26 wks³. The Irish outcome data is similar⁴.

It is less certain whether neurodevelopment impairment (NDI) has reduced in parallel with the decrease in mortality. The important components of neurological outcome assessment are motor development, learning disorders, speech and language delay, attention deficit disorders, visual and hearing problems. The preterm infant's risk of having a disability increases with decreasing gestational age at birth. Infants are at greater risk of cerebral palsy if they have Grade 3 or 4 IVH (intraventricular haemorrhage) or PVL (periventricular leukomalacia).

Kempf et al⁵ have recently attempted to answer the frequently asked question whether NDI rates are improving. They sought published studies from neonatal intensive care units that had reported their results on at least 2 time periods, the first being in the 1990s. The entry criteria were infants less than 27 weeks gestation and/or birthweight less than 1000g. During the period 1990-2020, there were 15 suitable studies with a total of 13,229 infants. The outcome variable was the Bayley's Scales assessment at age 18-36 months of age in the majority of the series. The other assessments used were Griffiths mental developmental scales and the Kyoto scales. The average rate of NDI at the first time point across all studies was 41.0% (95% CI 34-48%). The improvement in outcomes in the subsequent time periods was small being -3.3% (95% CI -8.8, - 2.2%). The other important point was that within these high risk infants the outcomes were gestational age dependent with the NDI rate decreasing 9.7% for each additional week gestation.

Previously, the Victorian Infant Collaborative Study (VICS) across 3 cohorts 1991-2, 1997, 2005 found that the average IQ was similar⁶. Rates of cerebral palsy⁷ remained constant over time at 11%. The EPICure studies, those born in 1995, and those born in 2006 reported similar rates of disability. The authors concluded that the improvements in survival between 1995 and 2006 were not matched by similar improvements in cognitive outcomes or a reduced rate

of neurodevelopmental delay. They further suggested that it was time to look at improving the provision of developmental and educational support as a vehicle for better outcomes⁸.

The findings of these studies indicate that improving the neurodevelopmental outcome for very preterm infants remains a major task. Reducing NDI rates is in part dependent on reducing the major complications associated with prematurity - intraventricular haemorrhage, periventricular leukomalacia, surgical necrotising enterocolitis, and chronic lung disease of infancy. Best management practices for an extreme preterm birth include transfer to a tertiary centre, antenatal magnesium sulphate, antenatal corticosteroid administration, delayed cord clamping, while of mode of delivery remains controversial⁹. CTG monitoring in very preterm labour is more difficult because the fetal autonomic nervous system is immature and the fetal heart patterns of later pregnancy are not present. After birth there is a major emphasis on safe effective resuscitation and stabilisation of the infant. There are debates about the neonatal best management strategies, one of the recurring ones being the administration of surfactant. The current guidance that it should be given if the infant is already intubated and ventilated for RDS, as this is better than when it is given later. For preterm infants commenced on CPAP, the F_iO_2 at 2 hours, if it is greater than 0.3, is helpful in predicting those who will need surfactant¹⁰. There are similar debates about early feeding and necrotising enterocolitis, prophylactic antibiotics, treatment of patent ductus arteriosus, and pain management.

In conclusion there have been a number of important recent studies on the outcome for extremely preterm infants. It is a complex issue with many independent factors. The best ways forward are twofold. Firstly the use of RCTs to inform on the best clinical options. Secondly, to continually record and assess the relationship between the NICU treatments being provided to infants and how they fare subsequently.

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Editor

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